REMARKS/ARGUMENTS

The office action of June 27, 2007 has been carefully reviewed and these remarks are responsive thereto. Reconsideration and allowance of the instant application are respectfully requested. Claims 1-32 are pending in this application. Claims 1-21 stand rejected. Claims 3-7, 16, and 19 have been amended to delete preferable features. Claims 22-32 have been added directed to the preferable features.

The undersigned brings to the attention of the Examiner that the typographical errors mentioned in the Office Action appear *only* in the Publication of the subject application (20060099422 A1, published May 11, 2006). The originally filed English Translation of the specification is correct. Therefore Paragraphs [00006] and [00018] of the Publication have been amended as suggested in the Office Action. Withdrawal of the objection is requested.

Claims 1-3, 5-7 stand rejected under 35 USC 102(b) over Shumaker. Claim 4 stands rejected under 35 USC 103(a) over Shumaker in view of Meadows.

In claim 1, the hard material particle structure is intact and not weakened at the grain edges in the porous zone. While Shumaker teaches maintaining the carbide grains with angular edges (column 5, line 20), the corresponding figures, e.g. figure 6, show the carbide structure is actually destroyed. Thus, although individual carbide grains may still have an angular shape, figure 6 shows that after only 30 seconds of treatment, there is no intact hard particle structure as claimed herein. Moreover, 30 seconds is not even the end of the treatment as Shumaker prefers a treatment of 2-15 minutes. See column 5, line 66. Thus, Shumaker does not teach that the hard material particles form an intact hard material particle structure within the porous zone, as claimed.

Importantly, Shumaker does not teach or suggest that the diamond layer is braced with the substrate material as claimed. In instant claim 1, "portions of the diamond layer are disposed deeper in the substrate than elevations of the first region." The "first region" is defined as the region of hard material particles (e.g. carbides) still surrounded by binding material (e.g. Co). This is illustrated by Fig. 3 of the instant application, where in the "first region" 24 there is still binder present.

The Office Action refers to figure 2 of Shumaker regarding this claimed feature. However, figure 2 does not show the diamond layer braced with the substrate material as claimed. In fact, according to Shumaker the pre-treatment creates a porous zone of 10 μm

(figure 1, column 5, line 19) or 5 μm (figure 2, column 6, line 55) which is well above (much higher than) the roughness of the transition region. Thus, while Shumaker teaches the diamond layer may be braced with the porous zone, Shumaker does not show the diamond layer braced with the intact substrate, i.e. such that portions of the diamond layer are disclosed deeper in the substrate than elevations of the first regions, as claimed.

Thus Shumaker does not teach or suggest the element of claim 1. Claims 2-7 depend from claim 1 and are patentable for the reasons given above.

In addition to the above, Shumaker further discloses 4.5% Co (example 1: column 4, line 67 and example 2: column 6, line 50) and values "up to 6% Co" (column 3, line 18). Thus, new claims 24 and 25 (more than 6%, 8-10% Co, respectively) are further distinguished over Shumaker.

Shumaker further does not discuss the grain size of the hard material particles. The Office Action notes values for grain size (found to be about 3.72 μm) and for the average peak-to-valley height R_x (found to be 7.20 μm). However, these values are not disclosed by Shumaker and further Shumaker does not teach any specific roughness values. An analysis of Fig. 1/Fig. 2 to determine roughness would be a hind-sight analysis afforded by present invention. That is, Shumaker is completely silent with regard to any roughness concepts or values. Thus, there is no teaching in Shumaker, that the average peak-to-valley height R of the transition region should be greater than the grain size of the hard metal, and certainly not greater than five times this value.

Withdrawal of these rejections is requested.

Claims 8-11, 16 and 18 stand rejected under 35 USC 103(a) over Bhat in view of Peters. Claim 17 stands rejected under 35 USC 103(a) over Bhat in view of Shumaker. Claims 19 and 21 stand rejected under 35 USC 103(a) over Bhat.

Bhat and Peters teach two contrasting approaches for pre-treatment of a substrate prior to diamond coating. Bhat teaches to first selectively etch the binder material (Co), then to selectively etch the hard material (carbide grains). The surface is then cleaned and a diamond film is deposited "on a desired portion of said surface of said cemented metal carbide structure of the substrate of the second cleaning step" (column 3, line 48-49). While alternative solutions are recognized in Bhat (such as the reference to Peters in column 2, line 48), Bhat specifically

teaches away from these solutions and provides a different approach: etch the binder, etch the carbides, and coat the surface thus obtained.

On the other hand, Peters teaches a solution, in which the sequence of the selective etching steps is reversed. The substrate is first etched selectively for tungsten carbides, and in a second etching step for the cobalt binder. It is stated in column 3, line 49, that "the substrate is then coated with diamond film". Peters teaches a particular and specific sequence of steps.

The skilled person would recognize that these two approaches contradict each other. Evaluating these approaches, the skilled person would possibly choose the one yielding better results, but would not attempt to combine such contrasting approaches, specifically considering that Bhat recognizes the process of Peters, but then teaches a process opposite to that of Peters.

Thus, in contrast to the position in the Office Action, a skilled person considering Bhat would have recognized that Bhat teaches performing the coating steps right after the tungsten carbide selective edging step with careful consideration to the thus obtained morphology (as related in Bhat column 5, line 35: "This morphology resulted in improved mechanical anchoring, and hence improved adhesion, of the deposited diamond film. Finally, the desired film is deposited upon the hereinabove prepared surface ..."). The skilled person would not have ignored this very specific teaching of Bhat, which is in contrast to Peters. One skilled in the art would not have combined Bhat and Peters to arrive at the 3-step method of claim 8.

Claim 9 recites that the first and third etching steps, which are both binding material-selective, differ in etching depth, such that the etching depths in the third step is less than in the first depths. Again, there is no teaching in the prior art regarding different etching depths. As explained above, Bhat and Peters do not teach or suggest the 3-step method of claim 8 as their solutions are opposite to each other. But even if the skilled person would have considered such a combination, Peters and Bhat do not teach or suggest such different etching steps.

Withdrawal of these rejections is requested.

Claims 12, 14, and 20 stand rejected under 35 USC 102(b) over Liu. Claim 13 stands rejected under 35 USC 103(a) over Liu in view of Peters. Claim 15 stands rejected under 35 USC 103(a) over Liu in view of Phillips.

Liu does not teach the claimed mechanical removal step by means of a blasting process with blasting particles. Paragraph [0109] of Liu, referred to in the Office Action, does not disclose blasting. Instead, it is referred to "ultrasonic diamond seeding (or scratching)".

Diamond seeding, also referred to as "scratching," is not a mechanical removal step, and is not at all comparable with blasting process. This method, which is well-known in diamond coating, introduces small diamond particles in the material to act as seeds for subsequently growing of a diamond layer. The seeding may be helped by ultrasound to anchor the "seeds" within the substrate. But it is clear to the skilled person that this process does not abrasively treat the surface, and thus is entirely different from blasting, which involves projecting blasting particles on the surface to remove hard material particles there.

Thus Liu does not teach or suggest claim 12. Claims 14 and 20 depend from claim 12 and are patentable for the reasons given above.

In regard to claim 15, since Liu only discloses scratching, there is absolutely nothing which would motivate a skilled person to employ the teaching of Philips as an intermediate step after a first etching step and before coating of the substrate. Philips relates to finishing tungsten carbide surfaces for calendar rolls, but does not relate to a prior etching treatment. Thus, the prior art does not show the combination of a chemical and a mechanical removal step as claimed.

Withdrawal of these rejections is requested.

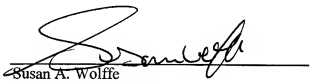
CONCLUSION

In view of the above amendments and remarks, withdrawal of the rejections and issuance of a Notice of Allowance is requested.

Respectfully submitted,

BANNER & WITCOFF, LTD.

Dated: October 29, 2007

By: 

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